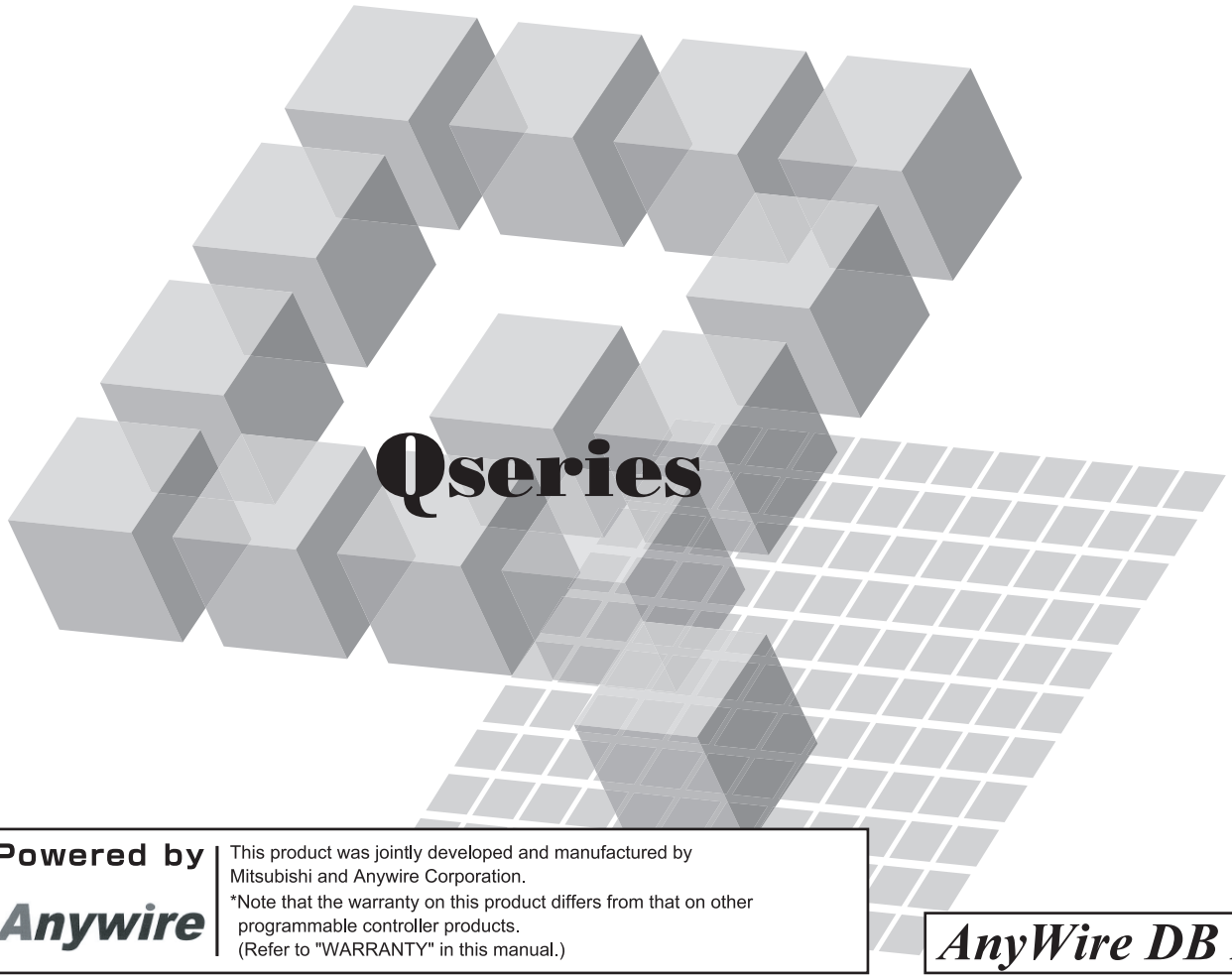
MITSUBISHI

Mitsubishi Programmable Controller

MELSEC Q series

MELSEC-Q AnyWire DB A20 Master Module User's Manual



Powered by Anywire

This product was jointly developed and manufactured by Mitsubishi and Anywire Corporation.

*Note that the warranty on this product differs from that on other programmable controller products. (Refer to "WARRANTY" in this manual.)

AnyWire DB A20

MODEL

-QJ51AW12D2

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PRECAUTIONS REGARDING WARRANTY AND SPECIFICATIONS

The QJ51AW12D2 is jointly developed and manufactured by Mitsubishi and Anywire Corporation.
Note that there are some precautions regarding warranty and specifications of this product.

<Warranty>

Item	QJ51AW12D2	Other programmable controller products (e.g. MELSEC-Q series)
Repair term after discontinuation of production	1 year	7 years

<Specifications>
The general specifications of the QJ51AW12D2 are the same as those of other MELSEC-Q series except under the following condition.

• When setting the transmission clock at 125kHz, apply the following specifications:
Voltage range of external power supply : 21.6 to 25.2VDC
Operating ambient temperature : 0 to 50°C

<Application of the EMC Directive>

Item	QJ51AW12D2	Other programmable controller products (e.g. MELSEC-Q series)
Applicable EMC standard	EN61131-2*1	EN61131-2

*1 The module with a serial number (the sixth digit) of 4 or later must comply with this standard.

<Application of the UL/cUL standards>

Item	QJ51AW12D2	Other programmable controller products (e.g. MELSEC-Q series)
Applicable UL standard/cUL standard	UL508*1 CSA22.2*1	UL508 CSA22.2

*1 The module with a serial number (the sixth digit) of 4 or later must comply with this standard.

●SAFETY PRECAUTIONS●

(Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.
The precautions given in this manual are concerned with this product only. For the safety precautions of the programmable controller system, refer to the user's manual for the CPU module used.

In this manual, the safety precautions are classified into two levels: "⚠ WARNING" and "⚠ CAUTION".

⚠WARNING	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Under some circumstances, failure to observe the precautions given under "⚠ CAUTION" may lead to serious consequences.
Observe the precautions of both levels because they are important for personal and system safety.

Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[Design Precautions]

⚠ WARNING

- An AnyWire DB A20 system has no control function for ensuring safety.
- When connecting a peripheral with the programmable controller CPU or a personal computer with an intelligent function module to modify data of a running programmable controller, configure an interlock circuit in the sequence program to ensure that the entire system will always operate safely. For other forms of control (such as program modification or operating status change) of a running programmable controller, read the relevant manuals carefully and ensure that the operation is safe before proceeding.
  Especially, when a remote programmable controller is controlled by an external device, immediate action cannot be taken if a problem occurs in the programmable controller due to a communication failure.
  To prevent this, configure an interlock circuit in the sequence program, and determine corrective actions to be taken between the external device and CPU module in case of a communication failure.
- Do not write any data to the "system area" of the buffer memory in the intelligent function module. Also, do not use any "use prohibited" signals as an output signal from the programmable controller CPU to the intelligent function module. Doing so may cause malfunction of the programmable controller system.

[Design Precautions]

⚠ CAUTION

- Although an AnyWire DB A20 system features high noise immunity, keep a distance of 100mm or more between the transmission cables or I/O cables and the high-voltage cables or power cables. Failure to do so may cause malfunction.
- Configure safety circuits, such as an emergency stop circuit and interlock circuit, external to the AnyWire DB A20 system.

[Installation Precautions]

⚠ CAUTION

- Use the programmable controller in an environment that meets the general specifications in the user's manual for the CPU module used.
  Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- To mount the module, while pressing the module mounting lever located in the lower part of the module, fully insert the module fixing projection(s) into the hole(s) in the base unit and press the module until it snaps into place.
  Incorrect interconnection may cause malfunction, failure or drop of the module.
  When using the programmable controller in an environment of frequent vibrations, fix the module with a screw.
  Tighten the screw within the specified torque range.
  Undertightening can cause drop of the screw, short circuit or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- Shut off the external power supply (all phases) used in the system before mounting or removing a module.
  Failure to do so may result in damage to the product.
- Do not directly touch any conductive parts or electronic components of the module.
  Doing so can cause malfunction or failure of the module.

[Wiring Precautions]

⚠ CAUTION

- Tighten the terminal screw within the specified torque range.
  Undertightening can cause short circuit, fire or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- Prevent foreign matter such as dust or wire chips from entering the module.
  Such foreign matter can cause a fire, failure, or malfunction.
- A protective film is attached to the top of the module to prevent foreign matter, such as wire chips, from entering the module during wiring.
  Do not remove the film during wiring.
  Remove it for heat dissipation before system operation.
- Incorrect wiring may damage modules and external devices. Adjust a cable length and a module position to prevent disconnection of a connector-type terminal block or a cable.
- Do not solder stranded wires of a cable when connecting them to the terminal block. Doing so may cause poor contact.
- The power supply voltage of remote slave modules may be insufficient due to a voltage drop in the power supply line. Connect an external power supply so that the voltage of remote slave modules is ensured.
- Do not apply the 24VDC power before wiring the entire AnyWire DB A20 system.
- Use 24VDC stabilized power supplies for devices in the AnyWire DB A20 system.
- Do not install the control lines or communication cables together with the main circuit lines or power cables.
  Failure to do so may result in malfunction due to noise.
- Place the cables in a duct or clamp them. If not, dangling cable may swing or inadvertently be pulled, resulting in damage to the module or cables or malfunction due to poor contact.
- When disconnecting the cable from the module, do not pull the cable by the cable part.
  For the cable connected to the terminal block, loosen the terminal screw. Pulling the cable connected to the module may result in malfunction or damage to the module or cable.

[Startup and Maintenance Precautions]

⚠ WARNING

- Do not touch any terminal while power is on. Doing so will cause electric shock or malfunction.
- Shut off the external power supply (all phases) used in the system before cleaning the module or retightening the terminal screws or module fixing screws.
  Failure to do so may result in electric shock.
  Undertightening the terminal screws can cause short circuit or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.

[Startup and Maintenance Precautions]

⚠ CAUTION

- Do not disassemble or modify the modules.
  Doing so may cause failure, malfunction, injury, or a fire.
- Shut off the external power supply (all phases) used in the system before mounting or removing a module.
  Failure to do so may cause the module to fail or malfunction.
- After the first use of the product, do not mount/remove the module to/from the base unit, and the terminal block to/from the module more than 50 times (IEC 61131-2 compliant) respectively.
  Exceeding the limit of 50 times may cause malfunction.
- Before handling the module, touch a grounded metal object to discharge the static electricity from the human body.
  Failure to do so may cause the module to fail or malfunction.

[Disposal Precautions]

⚠ CAUTION

- When disposing of this product, treat it as industrial waste.

●CONDITIONS OF USE FOR THE PRODUCT●

(1) Mitsubishi programmable controller ("the PRODUCT") shall be used in conditions;
i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and
ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.
MITSUBISHI SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI'S USER, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.
("Prohibited Application")
Prohibited Applications include, but not limited to, the use of the PRODUCT in;
- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

Notwithstanding the above, restrictions Mitsubishi may in its sole discretion, authorize use of the PRODUCT in one or more of the Prohibited Applications, provided that the usage of the PRODUCT is limited only for the specific applications agreed to by Mitsubishi and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the PRODUCTs are required. For details, please contact the Mitsubishi representative in your region.

COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES

(1) Method of ensuring compliance

To ensure that Mitsubishi programmable controllers maintain EMC and Low Voltage Directives when incorporated into other machinery or equipment, certain measures may be necessary. Please refer to one of the following manuals.

- QCPU User's Manual (Hardware Design, Maintenance and Inspection)
- Safety Guidelines
  (This manual is included with the CPU module or base unit.)

The CE mark on the side of the programmable controller indicates compliance with EMC and Low Voltage Directives.

(2) Additional measures

To ensure that this product maintains EMC and Low Voltage Directives, please refer to Page 50, Appendix 1.

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TERMS

Unless otherwise specified, this manual uses the following terms.

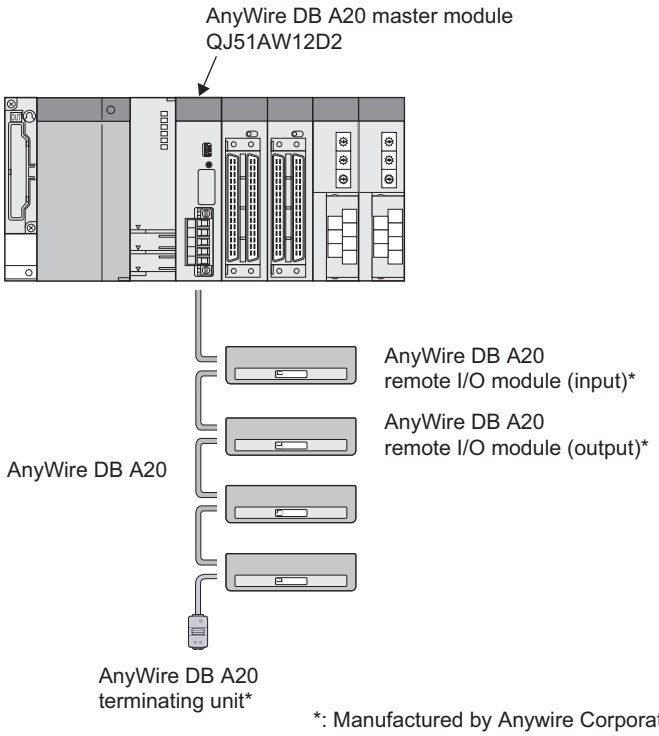
Term	Description
QJ51AW12D2	The abbreviation for the AnyWire DB A20 master module, QJ51AW12D2
MELSEC-Q series	The abbreviation for the Mitsubishi programmable controller MELSEC-Q series
Programmable controller CPU	The abbreviation for the MELSEC-Q series CPU module
Intelligent function module	A Q-series module other than CPU modules, power supply modules, and I/O modules, which is mounted on a base unit
Master module	A module that controls a data link system. One master module is required for one system.
Remote I/O module	A module that communicates I/O data with a master module
Programming tool	A generic term for GX Works2 and GX Developer
GX Works2	The product name of the software package for the MELSEC programmable controllers
GX Developer	
AnyWire DB A20	An original transmission system provided by Anywire Corporation. The full-duplex transmission mode enables a high-speed and long-distance communication. This system provides a high-speed and highly-reliable sensor network.
Slave module	A generic term for modules that communicate data with a master module
Bridge module	A module that serves as a master module in a transmission system such as OpenBus
Terminating unit	A waveform shaper
Transmission cycle time	A data sampling interval
Buffer memory	A memory in an intelligent function module, where data (such as setting values and monitoring values) exchanged with a CPU module are stored

CHAPTER 1 OVERVIEW

This manual describes the specifications, part names, and settings of the QJ51AW12D2 AnyWire DB A20 master module (hereafter abbreviated as the QJ51AW12D2).
This module, a product of the joint development project with Anywire Corporation, allows the AnyWire sensor network system to be constructed in a MELSEC-Q series programmable controller system.
The AnyWire DB A20 system is a high-speed and highly reliable sensor network system.

<Features of AnyWire DB A20>

The transmission distance can be selected from 50m/200m/1km/3km using the dip switch.
Up to 512 remote input points and 512 remote output points can be controlled by one QJ51AW12D2 (in the standard setting).
Disconnections can be detected even when the wiring is branched.



<Configuration of the AnyWire DB A20 system>

The following table lists the maximum number of connectable modules in one AnyWire DB A20 system.

Module	The maximum number of connectable modules
Master module	1
Slave module	128

Memo

CHAPTER 2 SPECIFICATIONS

2.1 General Specifications

Item	Specifications					
Operating ambient temperature	0 to 55°C *4					
Storage ambient temperature	–25 to 75°C					
Operating ambient humidity	5 to 95%RH, non-condensing					
Storage ambient humidity						
Vibration resistance	Compliant with JIS B 3502 and IEC 61131-2		Frequency	Constant acceleration	Half amplitude	No. of sweeps
		Under intermittent vibration	5 to 8.4 Hz	–	3.5 mm	10 times each in X, Y, and Z directions
			8.4 to 150 Hz	9.8 m/s^2	–	
		Under continuous vibration	5 to 8.4 Hz	–	1.75 mm	–
			8.4 to 150 Hz	4.9 m/s^2	–	
Shock resistance	Compliant with JIS B 3502 and IEC 61131-2 (147 m/s^2, 3 times each in X, Y, and Z directions)					
Operating atmosphere	No corrosive gas					
Operating altitude *1	0 to 2,000 m					
Installation location	Inside the control panel					
Overvoltage category *2	II or less					
Pollution degree *3	2 or less					
Equipment class	Class I					

*1 Do not use or store the programmable controller under pressure higher than the atmospheric pressure at sea level. Doing so may cause malfunction.
When using the programmable controller under pressure, please consult your local Mitsubishi representative.

*2 This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within premises.
Category II applies to equipment for which electrical power is supplied from fixed facilities.
The surge voltage withstand level for up to the rated voltage of 300 V is 2500 V.

*3 This index indicates the degree to which conductive material is generated in terms of the environment in which the equipment is used.
In pollution degree 2, only non-conductive pollution occurs. A temporary conductivity caused by an accidental condensation may also occur occasionally.

*4 When the transmission clock is set to 125 kHz, use the product under the following conditions.
- External power supply voltage range: 21.6V DC to 25.2V DC
- Operating ambient temperature: 0 to 50°C

2.2 Performance Specifications

2.2.1 Performance specifications

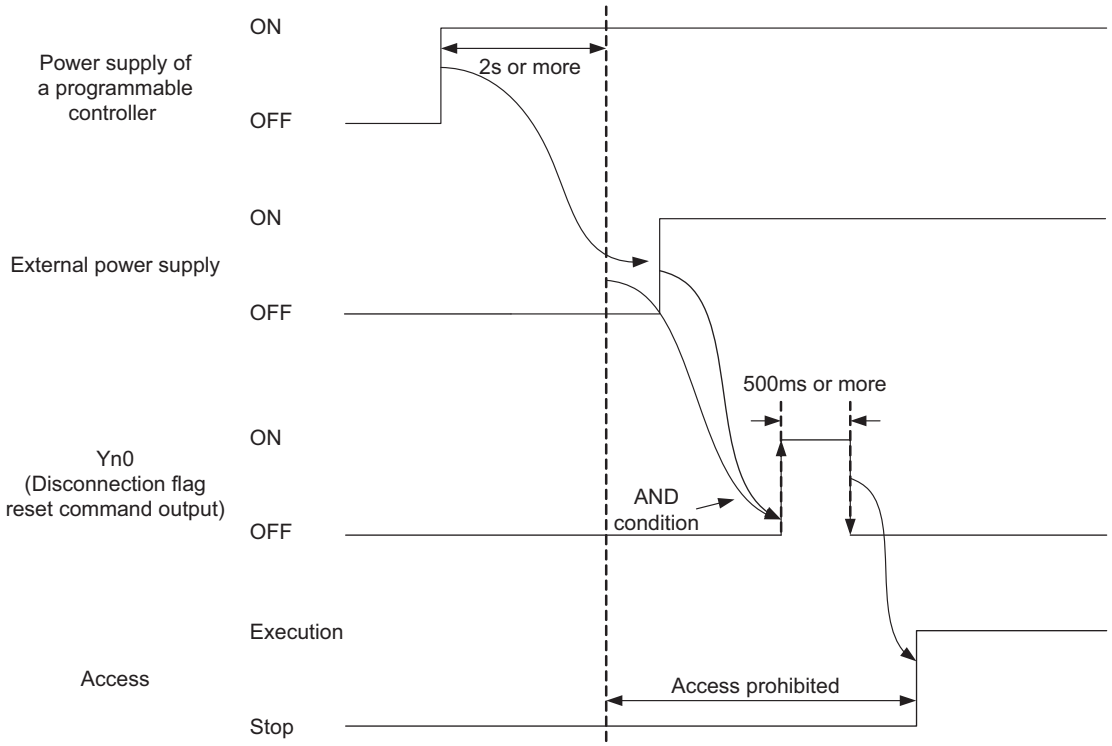
Item	Specifications			
Transmission clock	125 kHz *3	31.3 kHz	7.8 kHz	2 kHz
Maximum transmission distance (Total length)	50 m	200 m	1 km	3 km
Number of connected modules	Up to 128	Up to 128	Up to 128	Up to 32 *1
Transmission system	Cyclic transmission with full-duplex mode			
Connection type	Bus topology (Multidrop system, T-branch system, tree branch system)			
Transmission protocol	Dedicated protocol (AnyWire DB A20)			
Error control	Double check system			
Number of connected I/O points	Up to 1024 points (512 input points/512 output points) (However, up to 1024 input points/1024 output points can be set) *2			
RAS function	Disconnected transmission line location detection function, transmission line short detection function, transmission line power supply voltage drop detection function			
DB A20 transmission line	• UL-compliant general-purpose 2-/4-wire cable (VCTF, VCT 0.75 to 1.25 mm^2, rated temperature 70°C or higher) • UL-compliant general-purpose wire (0.75 to 1.25 mm^2, rated temperature 70°C or higher) • FK4-UL075-100 (AnyWire) (0.75 mm^2, rated temperature 90°C) (UL-compliant item) (Regardless of the type of the transmission line, when the transmission distance exceeds 200 m, use wires with a diameter of 0.9 to 1.25 mm^2.)			
24VDC power cable	• UL-compliant general-purpose 2-wire cable (VCTF, VCT 0.75 to 2.0 mm^2, rated temperature 70°C or higher) • UL-compliant general-purpose wire (0.75 to 2.0 mm^2, rated temperature 70°C or higher) • FK4-UL075-100 (AnyWire) (0.75 mm^2, rated temperature 90°C) (UL-compliant item)			
Power supply *3	Circuit: (Supplied from the Q bus side) Voltage +5 [V] ±5% Current 0.5 [A] max. Transmission line: Voltage 24 V DC +15 to -10% (21.6 to 27.6 V DC), ripple voltage 0.5 Vp-p or lower Current 0.5 [A] (When 128 slave modules are connected and the load current is not included)			
Number of I/O occupied points	32 points (I/O assignment: intelligent 32 points)			
Number of writes to EEPROM	100000 times (maximum)			
External dimensions	98 mm (H) × 27.4 mm (W) × 100 mm (D)			
Weight	0.11 kg			

*1 Up to 64 modules can be connected within 2km.
*2 Used when required in special situations.
*3 When the transmission clock is set to 125 kHz, use under the following conditions.
- External power supply voltage range: 21.6 V DC to 25.2 V DC
- Operating ambient temperature: 0 to 50°C

2.2.2 Power supply sequence and handling of I/O data

An incorrect input/output may occur depending on the supply procedure of the power of the QJ51AW12D2, the external power supply for transmission line, and the external power supply for slave module. Pay attention to the following points.

- The QJ51AW12D2 requires 2 seconds of elapsed time after power-on (the power supply of the programmable controller).
  Therefore, do not make any access related to this module (X, Y, or FROM/ TO) for 2 seconds after the programmable controller is powered on.
- Follow the procedure of powering on the programmable controller. Power on the programmable controller, then power on the external power supply.
- Depending on how to supply the external power supply, Disconnection flag (Xn4) may turn on (the "ALM" LED may turn on) during initial processing. Therefore, change Disconnection flag reset (Yn0) from ON (500ms or more) to OFF at the start of access.



2.3 Applicable System

(1) Mountable modules and the number of mountable modules

The applicable CPU module, network module, and the number of mountable modules for the QJ51AW12D2 are shown below.

Insufficient power capacity may occur depending on the combination of other modules and the number of mountable modules.

When mounting the modules, consider the power capacity.

If the power capacity is insufficient, reconsider the combination of the mounted modules.

Connectable module			Base unit mountability	Number of mountable modules
Module type		Model name		
CPU module	Basic model QCPU	Q00JCPU	○	Up to 8
		Q00CPU, Q01CPU		Up to 24
	High Performance model QCPU	Q02CPU, Q02HCPU, Q06HCPU, Q12HCPU, Q25HCPU	○	Up to 64
	Universal model QCPU	Q00UJCPU	○	Up to 8
		Q00UCPU, Q01UCPU		Up to 24
		Q02UCPU		Up to 36
		Q03UDCPU, Q04UDHCPU, Q06UDHCPU, Q10UDHCPU, Q13UDHCPU, Q20UDHCPU, Q26UDHCPU		Up to 64
		Q03UDECPU, Q04UDEHCPU, Q06UDEHCPU, Q10UDEHCPU, Q13UDEHCPU, Q20UDEHCPU, Q26UDEHCPU, Q50UDEHCPU, Q100UDEHCPU		
	Process CPU	Q02PHCPU, Q06PHCPU, Q12PHCPU, Q25PHCPU		Up to 64
	Redundant CPU	Q12PRHCPU, Q25PRHCPU	△	Up to 53
C controller module		Q06CCPU-V-B, Q06CCPU-V, Q06CCPU-V-H01, Q12DCCPU-V	○	Up to 64
		Q24DHCCPU-V	○	Up to 62
Network module		QJ72LP25-25, QJ72LP25G, QJ72LP25GE, QJ72BR15	○	Up to 64

○: Can be mounted, △: Cannot be mounted to the main base unit, can be mounted to the extension base unit

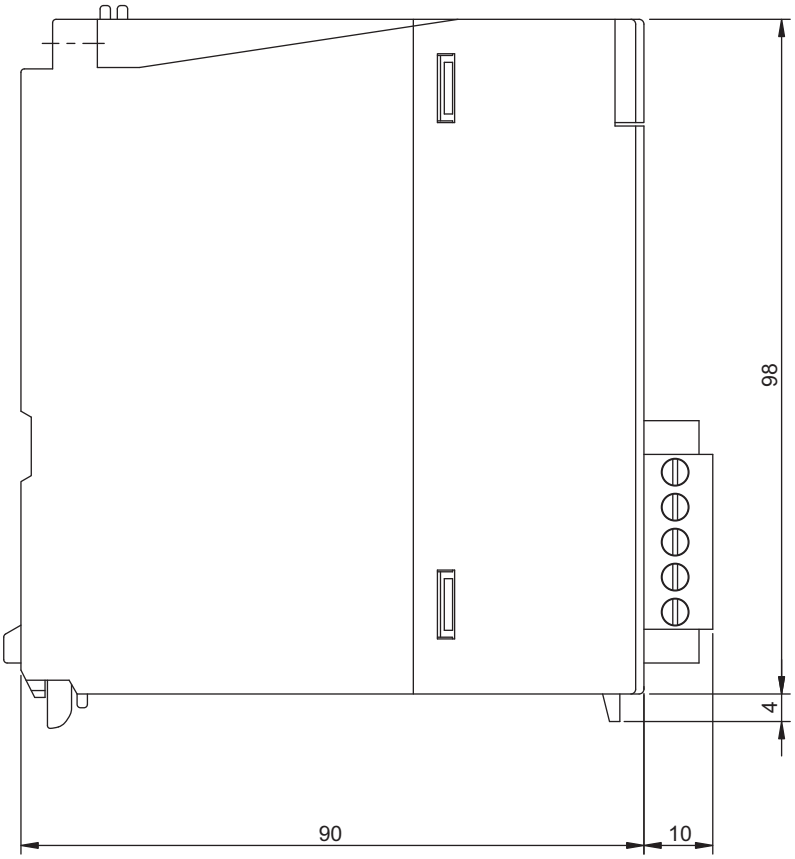
(2) Compatibility with multiple CPU system

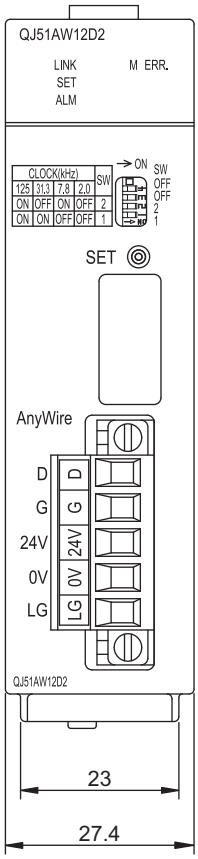
The QJ51AW12D2 supports the multiple CPU system from its first product.

When using the QJ51AW12D2 in the multiple CPU system, refer to the following manual.

- QCPU User's Manual (Multiple CPU System)

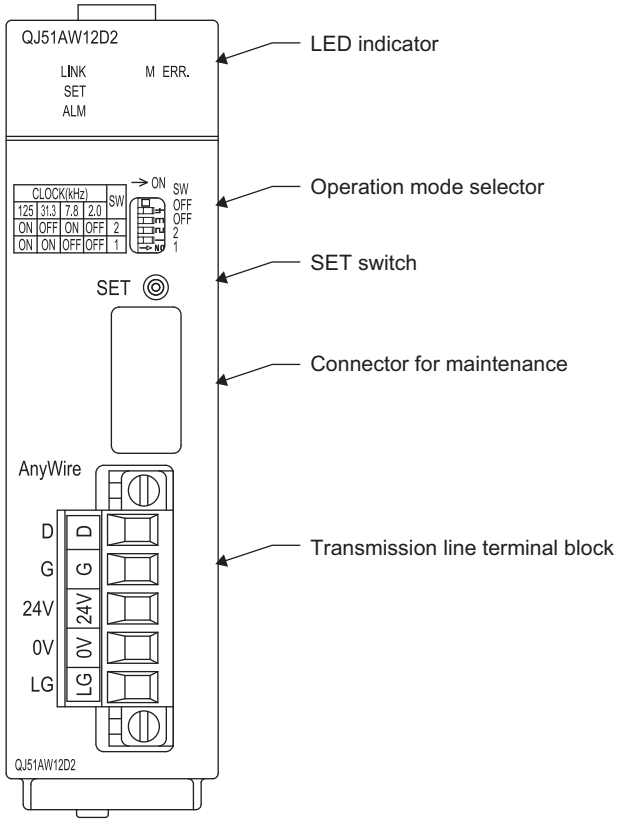
2.4 External Dimensions





(Unit: mm)

2.5 Part Names



For details on each part, refer to the following.

- LED indicator : Page 34, CHAPTER 6
- Operation mode selector : Page 21, Section 3.1
- SET switch : Page 31, Section 5.1
- Transmission line terminal block : Page 36, CHAPTER 7

2.6 Module Mounting

1. **To mount the module, while pressing the module mounting lever located in the lower part of the module, fully insert the module fixing projection(s) into the hole(s) in the base unit and press the module until it snaps into place.**
   Incorrect interconnection may cause malfunction, failure, or drop of the module.
2. **When using the programmable controller in an environment of frequent vibrations, fix the module with a screw.**
   Screw type : Module fixing screw (M3x12 screws)
   Tightening torque : 0.36 to 0.48 N•m

Point

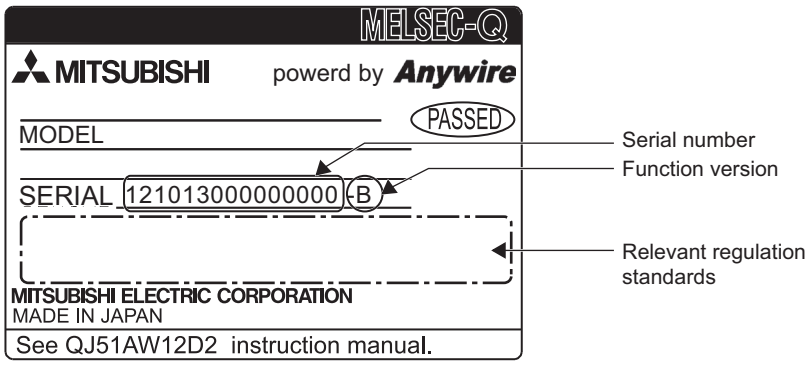
- Do not drop the module or expose it to stronger vibrations than those in the general specifications. Doing so may damage the case or cause the malfunction of the module.
- Do not remove the printed-circuit board of the module from the case. Doing so may cause failure.
- Before handling the module, touch a conducting object such as a grounded metal to discharge the static electricity from the human body. Failure to do so may cause failure or malfunction.

2.7 Checking Function Version and Serial Number

The serial number and function version of the QJ51AW12D2 can be checked on the rating plate and the front of the module.

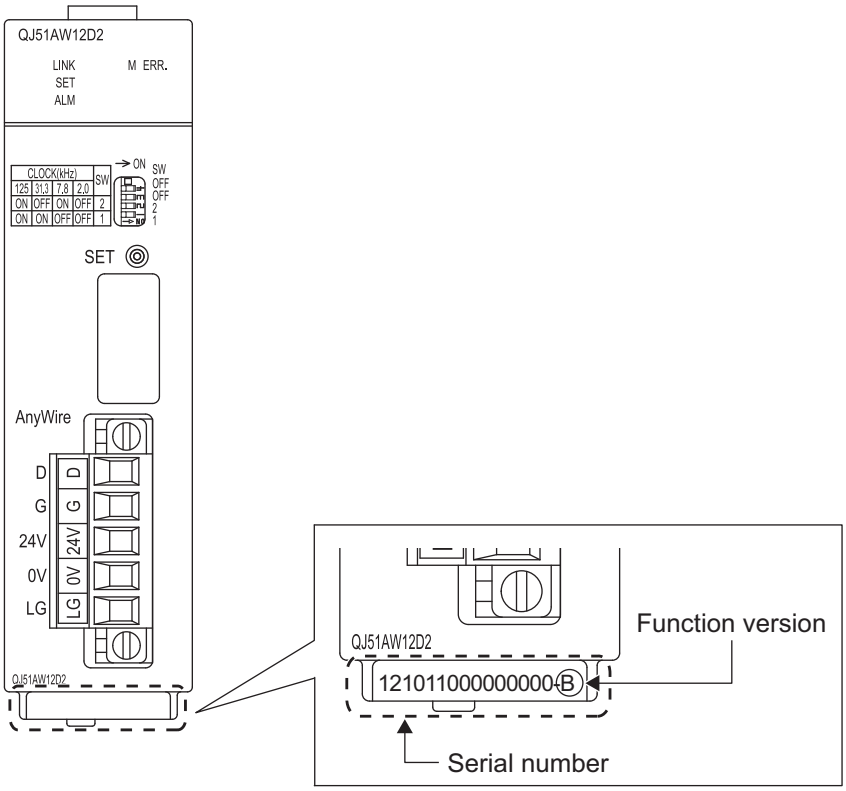
(1) Checking on the rating plate

The rating plate is located on the side of the QJ51AW12D2.



(2) Checking on the front (at the bottom) of the module

The serial number on the rating plate is printed on the front (at the bottom) of the module.



CHAPTER 3 OPERATION MODE

Connect the slave module for the AnyWire DB A20.

3.1 Operation Mode Selector

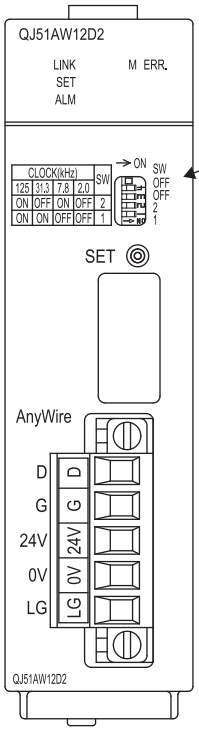
Select the settings such as the transmission distance using the operation mode selector (4-gang dip switch).

SW-1, 2 Set the transmission distance using a combination of ON/OFF for 1 and 2.

SW-3 System reserve (Set the switch to OFF. Using the module with this switch set to ON may cause malfunction.)

SW-4 System reserve (Set the switch to OFF. Using the module with this switch set to ON may cause malfunction.)

Switch		Specifications
1	2	
OFF	OFF	2 kHz 3 km
OFF	ON	7.8 kHz 1 km
ON	OFF	31.3 kHz 200 m
ON	ON	125 kHz 50 m



Operation mode selector

CLOCK(kHz)				SW
125	31.3	7.8	2.0	
ON	OFF	ON	OFF	2
ON	ON	OFF	OFF	1

ON
SW
OFF
OFF
2
1

To enable the operation mode selector, switch it to the right.

*The default switch setting is OFF.

Point

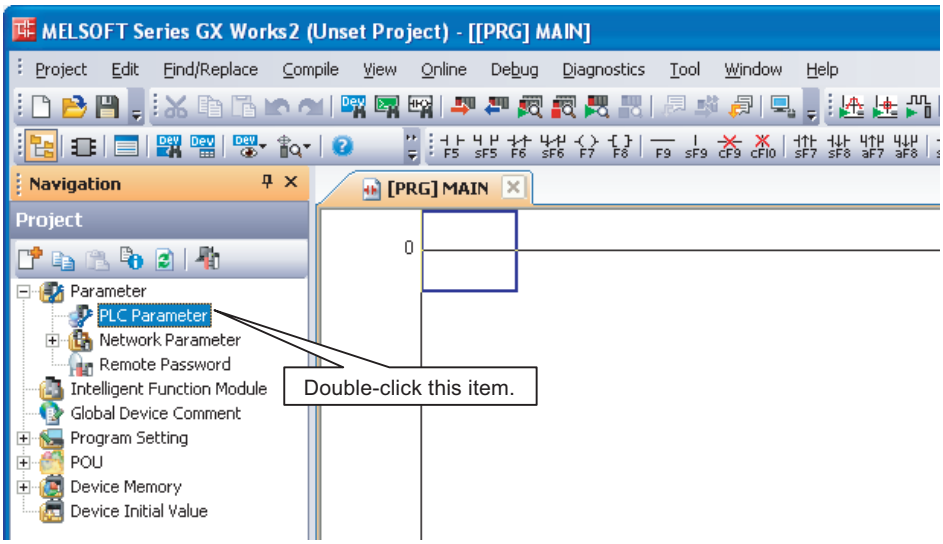
- Switch off the power supply before setting the operation mode.
- Set the operation mode according to the transmission specifications being used.
- If the transmission specifications of the QJ51AW12D2 do not mach those of the connected slave module, transmission cannot be performed correctly, resulting in malfunction.
- The operation mode selector is recessed from the front surface.
  When setting the switch, use a precision driver and be careful not to damage any of the internal boards.

3.2 Number of Transmission Points Setting

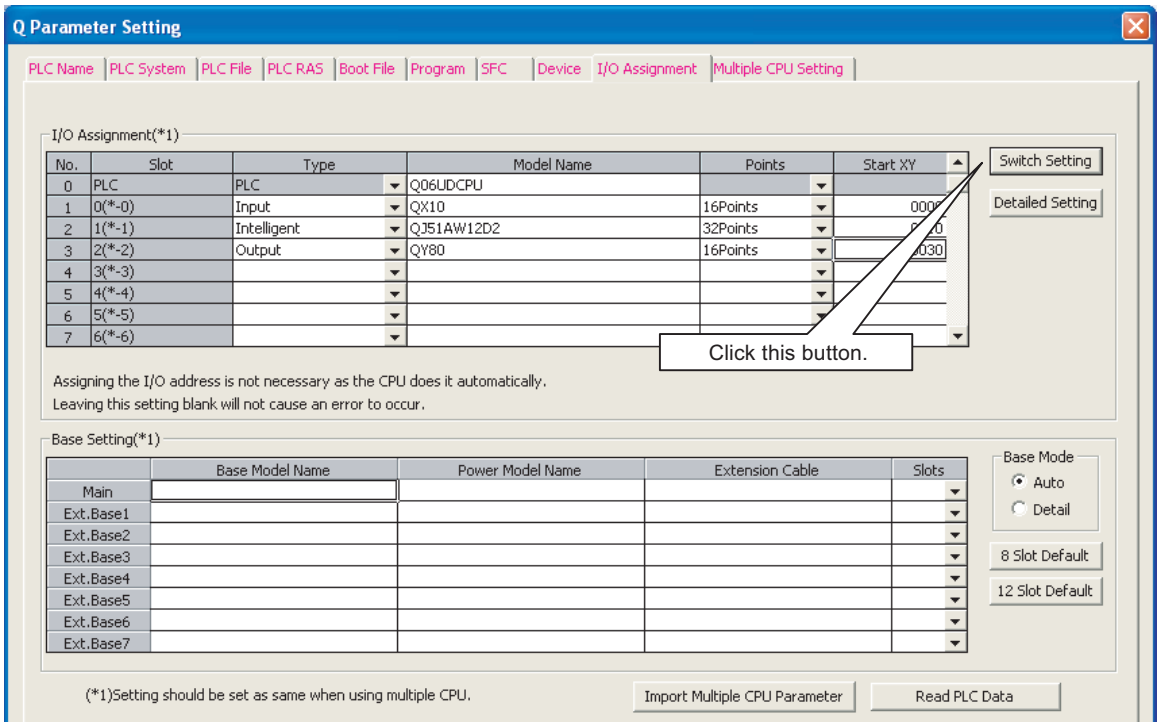
Configure the number of transmission points using the switch 1 of "Switch Setting for I/O and Intelligent Function Module".

Double-click the "PLC Parameter" in the Project window of the programming tool, and perform the following operations.

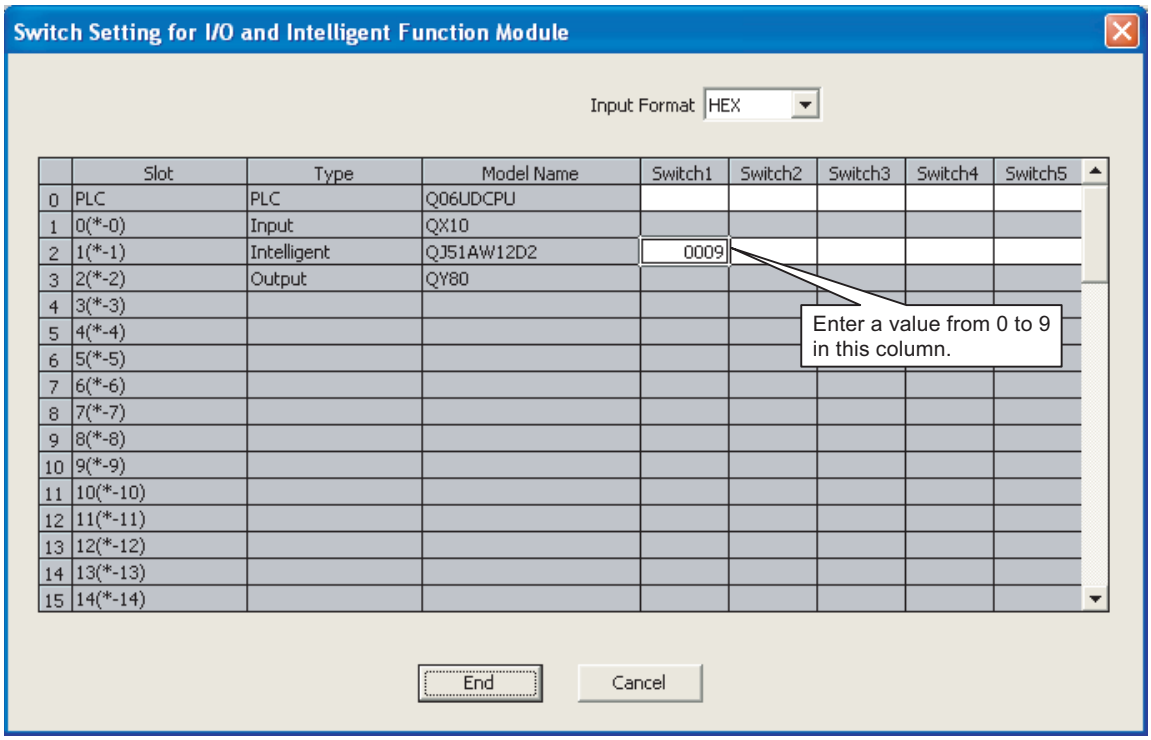
- Click the "I/O Assignment" tab.
- Click the "Switch Setting" button.
- Open the "Switch Setting for I/O and Intelligent Function Module" dialog box.
- Set any value from 0 to 9 for "Switch 1".



"Q Parameter Setting" Dialog Box



"Switch Setting for I/O and Intelligent Function Module" Dialog Box



Point

Configure the setting for "Switch 1".
Furthermore, set the correct and suitable value for the slot position of the QJ51AW12D2.
If the settings are not configured, or if the setting position or the switch selection value is incorrect, AnyWire DB A20 transmission does not operate normally.

■ Correspondence between the value from 0 to 9 set for "Switch 1" and the number of connected I/O points

Number of connected I/O points		Switch 1
Input	Output	
512	512	0
448	448	1
384	384	2
320	320	3
256	256	4
192	192	5
128	128	6
64	64	7
32	32	8
1024	1024	9 *4

A to F of "Switch 1" are reserved by the system. Do not change the settings.

*4 Used when required in special situations.
Transmission also can be made for normal use. However, the address after the "Maximum address setting–Number of self occupied points" of the slave module for AnyWire DB A20 becomes unassigned, and the transmission cycle time becomes slower.

Ex. For 32-Point Remote I/O Module

- Maximum address setting: 510
- Number of self occupied points: 32 points

According to the details above, up to 510 to 541 points are used as the maximum address that is occupied by the remote I/O module.
Addresses of 541 to 1023 points become unassigned, and cannot be assigned.

Point

If the switch settings are changed using the programming tool, write the parameters and supply the power again or reset the system.
Without these operations, transmission points are not configured.

CHAPTER 4 PROGRAMMING

This chapter explains the program of the QJ51AW12D2.
When applying the program examples introduced in this chapter to the actual system, ensure the applicability and confirm that it does not cause system control problems.

4.1 I/O Signals with CPU Module

The QJ51AW12D2 is an intelligent function module. Thirty-two input points and 32 output points are used for the data communication with the CPU module.
System status information is stored in this area.
The "buffer memory area" is used to input/output the signal to/from the remote I/O module.

4.1.1 I/O signal list

The "n" in the table below is the start I/O number of the QJ51AW12D2 which is determined according to the installation position and modules installed before the QJ51AW12D2.

Ex. If the start I/O number of the QJ51AW12D2 is "X/Y10"

Xn0 to X(n+1)F → X10 to X2F
Yn0 to X(n+1)F → Y10 to Y2F

Input number	Signal name	Output number	Signal name
Xn0	Module READY	Yn0	Disconnection flag reset command output
Xn1	Short between D and G terminals	Yn1	Automatic address detection command output
Xn2	Short between D and 24 V terminals	Yn2 to YnF	Use prohibited
Xn3	24 V not applied		
Xn4	D/G line disconnection		
Xn5 to Xn7	Use prohibited		
Xn8 to XnB	"Switch Setting for I/O and Intelligent Function Module" Switch 1 setting value*		
XnC to XnF	Use prohibited		
X(n+1)0 to X(n+1)F	Use prohibited	Y(n+1)0 to Y(n+1)F	Use prohibited

* When 8 is set for "Switch 1", the settings are as follows.
Xn8: OFF, Xn9: OFF, XnA: OFF, XnB: ON

4.1.2 Details of the input signal

The input signal "Xn0" is the "Module READY" flag, and it turns "ON" while the QJ51AW12D2 is operating normally. (It does not turn OFF with Xn1 to Xn4 errors.)
If the input signal is "Xn1 to Xn4", an "Error Flag" that shows the condition of the AnyWire DB A20 transmission cable turns on.
If normal, the corresponding input signal switches to "OFF", and if an error occurs, it switches to "ON".
Xn1 to Xn3 flags turn "OFF" when the error is removed and then maintain the OFF status.
Xn4 maintains the ON status even when the error is removed.
Xn4 turns "OFF" by resetting the power or outputting the signal to Yn0. (☞ Page 26, Section 4.1.3)
The ON/OFF status is also indicated depending on whether the "ALM" LED is ON or how the "ALM" LED flashes.

Input signal No.	Description	Normal	Error
Xn0	Module READY (Turns OFF when a watchdog timer error occurs)	ON	OFF
Xn1	Short between D and G terminals	OFF	ON
Xn2	Short between D and 24 V terminals	OFF	ON
Xn3	24VDC is not being supplied to the QJ51AW12D2 or the voltage is low.	OFF	ON
Xn4	D/G line disconnection, a slave module error, or power is not being supplied	OFF	ON

For Xn8 to XnB, enter the value set for switch 1 of the "Switch setting for I/O and Intelligent Function Module". Xn8 to XnB are used to check the settings.

4.1.3 Details of the output signal

(1) Disconnection flag reset command output

When output signal Yn0 is turned from OFF to ON and the disconnection error has been removed, the abnormal address information can be cleared by turning "OFF" the disconnection flag (Xn4) and resetting the number of the error addresses to "0".
If the error has not been removed, the error flag, the number of the error addresses, and error address are set.
Abnormal address information can also be cleared by supplying the power again.

(2) Automatic address detection command output

Turning the output signal Yn1 from OFF to ON starts the automatic detection of the address. (☞ Page 31, CHAPTER 5) (The "Automatic address detection" function can be also operated using the SET switch.)

4.2 Buffer Memory Area

This area is for data communication between the QJ51AW12D2 and CPU module.

Buffer memory address	Description
100_H to $13F_H$*5	Input (1024 points): The lowest bit of 100_H is the 0th data, and the highest bit of $13F_H$ is the 1023rd data.
1100_H to $113F_H$*5	Output (1024 points): The lowest bit of 1100_H is the 0th data, and the highest bit of $113F_H$ is the 1023rd data.
2000_H	Number of error IDs (1 word)
2001_H to 2080_H	Error ID information

*5 The buffer memory address occupies a 64-word sized area, irrespective of the number of I/O points set for "Switch 1" setting on Page 22, Section 3.2.

Ex. Correspondence between the buffer memory address and AnyWire DB A20 input address

Buffer memory address	Bit No.															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
100_H	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
101_H	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16

AnyWire input address: 0

4.2.1 I/O area

The slave module requires "Address setting" which specifies the start number assigned in the transmission frame. The settings are configured in 2-point unit. The addresses of both an input slave module (e.g. input remote I/O module) and an output slave module (e.g. output remote I/O module) start from "0", and the area later than that number is occupied corresponding to the number of module points.

Ex. Assignment of two 8-point input remote I/O modules

Buffer memory address	Bit No.															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
100_H (input)	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

AnyWire address: 15 ---------- AnyWire address: 0

Occupied area by the address 8 on the 8-point input remote I/O module

Occupied area by the address 0 on the 8-point input remote I/O module

4.2.2 Number of error addresses

The number of error IDs (addresses) is entered in 2000_H. (☞ Page 31, CHAPTER 5)
Any value from 0 to 128 is entered.

4.2.3 Value of error addresses

If a disconnection or a slave module error is occurred, the error address is written to 2001_H to 2080_H in the order from the lowest address up to 128 addresses.
This value is maintained until the disconnection error is reset or until the power is turned off.

Buffer memory address	Description
2001_H	Error address 1
2002_H	Error address 2
2003_H	Error address 3
¦	¦
¦	¦
$207F_H$	Error address 127
2080_H	Error address 128

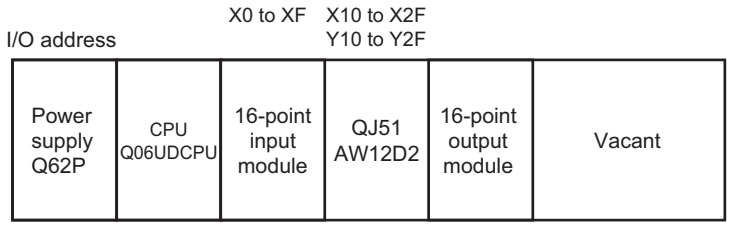
The detected error address is classified and displayed in the memory and on the monitor according to the table below.

Hexadecimal display address	Description
000_H to $1FF_H$	Slave module output address
200_H to $3FF_H$	Slave module input address

The lower 2 digits indicate the address set for the slave module.
The uppermost digit indicates the type of the slave module.

4.3 Program Example

The configuration of the programmable controller is as shown below.



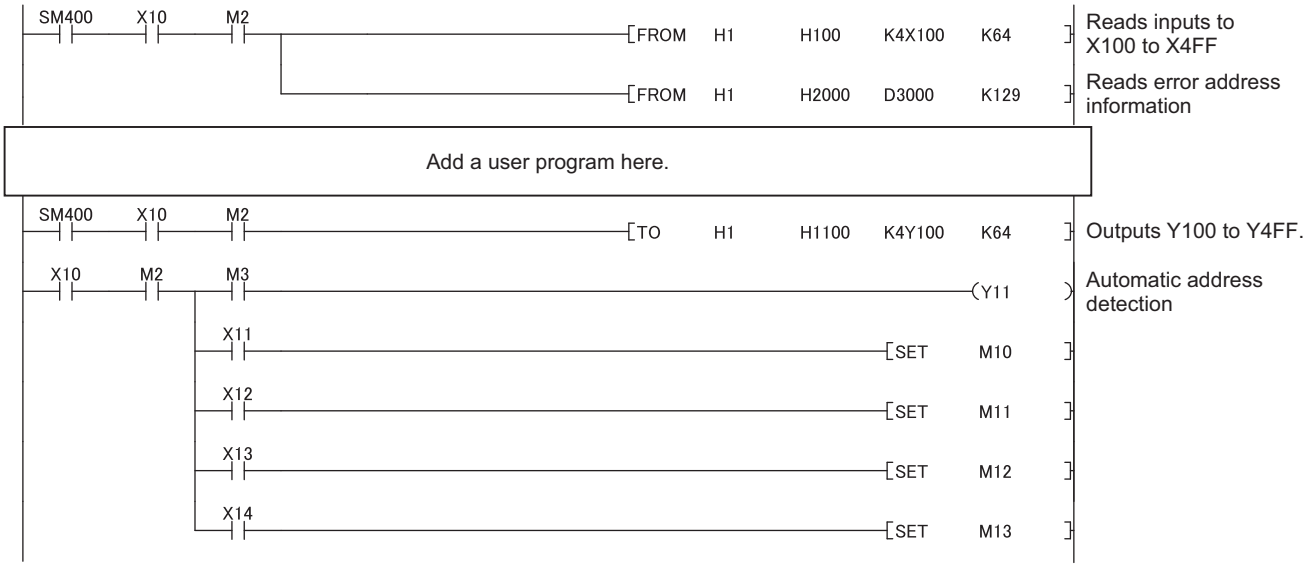
- Used device

Device No.	Application
SM400	Always ON
X10	Module READY
X11	Short flag between D and G terminals
X12	D-24 V short flag
X13	24 V low flag
X14	Disconnection flag between D and G terminals
Y10	Disconnection flag reset command output
Y11	Automatic address detection command output
M1	Disconnection flag reset command input
M2	Access start flag
M3	Automatic address detection command input
M10	Short display between D and G terminals
M11	D-24 V short display
M12	24 V low display
M13	D, G disconnection display
T1	Disconnection flag output ON time (500 ms)

- Program

<Disconnection flag clear>

Input is output by the FROM instruction, and output is output by the TO instruction.
A user program is added between the FROM and TO instructions.



The correspondence between each signal and the device in the program above is as shown below.

Signal type	Corresponding device
Input (1024 points)	X100 to X4FF
Output (1024 points)	Y100 to Y4FF
Error address information	D3000 to D3128

CHAPTER 5 MONITORING FUNCTION

The AnyWire DB A20 slave module has the specific ID (address). When the QJ51AW12D sends the ID (address), the disconnection and the existence of slave modules are detected by receiving a reply from the slave module having the corresponding ID (address).
The QJ51AW12D2 uses the automatic address detection operation to store the addresses of the currently connected slave modules in the EEPROM.
This information is stored even when the power is turned off.
The QJ51AW12D2 sends the registered addresses in order. If the corresponding slave module does not reply, the "ALM" LED displays that a disconnection occurred. Then an error flag is returned to the memory area on the host side. Furthermore, this slave module address can be checked.

5.1 Automatic Address Detection

Automatic address detection is a function to store the ID (address) of the connected slave module in the EEPROM of the QJ51AW12D2.
In the initial system startup, the module ID is not registered. Therefore, when the power is on, the "ALM" LED and the "D/G line disconnection" flag are turned on. (☞ Page 25, CHAPTER 4, Page 34, CHAPTER 6)
I/O data can be transmitted in this state. However, to use the disconnected branch line detection function, operate "automatic address detection" at this point.

Operate the automatic address detection in the following situations.

- When starting the system operation after confirming that all the slave modules connected to the master modules are operating normally
- When adding a slave module after starting the system operation
- When deleting a slave module after starting the system operation
- When changing the address of a slave module after starting the system operation

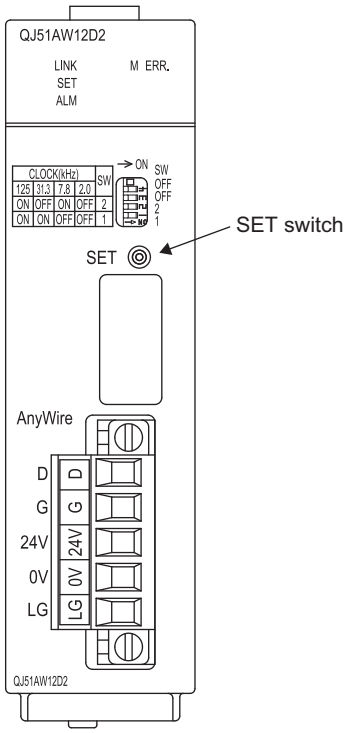
5.1.1 Automatic address detection operation

Use the SET switch or Automatic address detection command output (Yn1) to operate the automatic address detection.

Using the SET switch

Procedure

1. **Check that all of the slave modules are operating normally.**
2. **Keep pressing the SET switch until the "SET" LED (green) turns on.**
3. **When the "SET" LED turns on, flashes, and turns off, the ID (address) has been stored.**



Using Automatic address detection command output (Yn1)

Procedure

1. **Check that all of the slave modules are operating normally.**
2. **Turn Automatic address detection command output (Yn1) from OFF to ON.**
   (For details on Automatic address detection command output (Yn1), refer to Page 25, CHAPTER 4.)
3. **When the "SET" LED turns on, flashes, and turns off, the ID (address) has been stored.**

Point

When an error such as a short occurs in AnyWire DB A20, when the power is turned on, or when the module is reset, the automatic address detection cannot be operated for approximately 5 seconds.

5.2 Monitoring Operation

Registered IDs (addresses) are sent in order. If the slave module does not reply, a disconnection is notified.

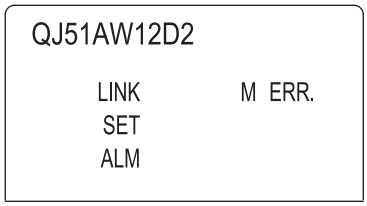
The "ALM" LED turns on and the input Xn4 turns on when a disconnection occurs.

This error information is maintained until the power is turned off or until the error reset (Yn0) is performed.

Point

To reset the "ALM" LED lighting and disconnection detected (Xn4: ON) which are detected during operation, after removing the fault, reset the power supply of the QJ51AW12D2 or turn on the disconnection flag clear command output (Yn0).
The automatic address detection also clears the display and the flag. However, if an unresponding module exists, its ID (address) is not registered; therefore, it is not monitored.

CHAPTER 6 LED DISPLAY



Display	Name	Color	Meaning	
LINK	Transmission status	Green	Flashing	Module operating status
			Off	Module error
SET	Address detection in progress	Green	On	During automatic address detection operation
			Flashing	During EEPROM write
			Off	During normal transmission
ALM	Transmission alarm	Red	On	AnyWire DB A20 D/G line disconnection, or no reply from the slave module
			Slow flashing *1	Short between D and G terminals, short between D and 24V terminals, or the equivalent status
			Fast flashing *2	24VDC is not being supplied, or the supply voltage is too low
			Off	During normal transmission
M ERR.	Hardware failure	Red	On	Turns on when an error occurs in the QJ51AW12D2 or the programmable controller. In this case, all functions are stopped. The error LED for the applicable CPU flashes. (Excluding EEPROM errors)
			Off	Module normal

*1 "Slow flashing": at approximately one-second intervals
*2 "Fast flashing": at approximately 0.2-second intervals

For details on the display when M ERR. is on, see the table below.

No.	On/Off status				Main Causes
	M ERR.	ALM	LINK	SET	
1	●	●	●	●	Internal ROM error
2	●	●	●	○	Internal RAM error
3	●	*1	*1	●	EEPROM error
4	●	○	○	○	Module initialization error
5	●	○	●	○	Watchdog timer error
6	●	○	○	●	Programmable controller CPU error (ITWDT)
7	●	○	●	●	Software error (IORSTL)

●:On, ○:Off

*1 These LEDs turn on, turn off, or flash according to the operating status.
No. 1 to 4 are checked only at the time of the reset.
Transmission is performed only when an EEPROM error occurs.

Memo

CHAPTER 7 CONNECTIONS

The connection terminals (transmission line terminal block) for the AnyWire DB A20 transmission line can be connected and disconnected easily.
The transmission lines and power supply lines are connected using the common terminal block.

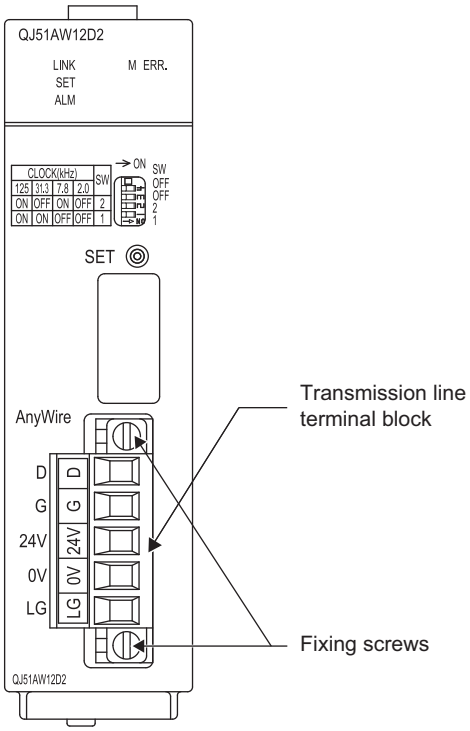
Point

For compliance with the EMC and Low Voltage Directives, refer to Page 50, Appendix 1.
Even when the compliance with the EMC and Low Voltage Directives is not required, use of an EMC-compliant configuration may reduce the influence from external noise.

7.1 Description of Terminals

Terminal	Description
D	QJ51AW12D2 AnyWire DB A20 transmission signal terminals D: Transmission line (+), G: Transmission line (-)
G	Connect to the D and G terminals to those on the slave module and terminating unit.
24V	Power supply terminals for driving the transmission circuit for the QJ51AW12D2. Connect a 24VDC stabilized power supply to the 24V and 0V terminals.
0V	
LG	Connect the LG terminal to the neutral point of the noise filter inserted between the 24V and 0V terminals. If malfunctions occur due to the power noise in the 24VDC system, ground the LG terminal with the functional ground terminal (FG terminal) on the programmable controller at a single point.

For details on connections to the D and G terminals on the slave module and terminating unit, refer to the relevant manuals of each product.



7.2 Transmission Line Terminal Block

Manufacturer	: Phoenix Contact Co., Ltd. (Contact: http://www.phoenixcontact.com/)
Model	: MSTB2,5/5-STF-5,08AU
Tightening torque	: 0.5 to 0.6 N•m

To tighten the connector, a flathead screwdriver having a tipped size of 0.6 × 3.5mm is required.
Before removing the transmission line terminal block, check that the fixing screws on both sides are completely loosened (removed from the socket).
Pulling with excessive force while the screws are still tightened may cause damage to the devices. Before connecting the connector, check that there are no short circuits due to the disconnected or frayed wires. Then tighten the screws at both sides securely. (Tightening torque: 0.5 to 0.6 N•m)

7.3 Cable Processing

Bare cables can be connected to the transmission line terminal block; however, for safety reasons, it is recommended to connect the crimped bar terminals.

For wiring, use the connection cables listed in Page 14, Section 2.2.1 and tighten them within the applicable tightening torque range.
Use UL-listed solderless terminals and, for processing, use a tool recommended by their manufacturer.

[Recommended bar terminals (manufactured by Phoenix Contact Co., Ltd.)]

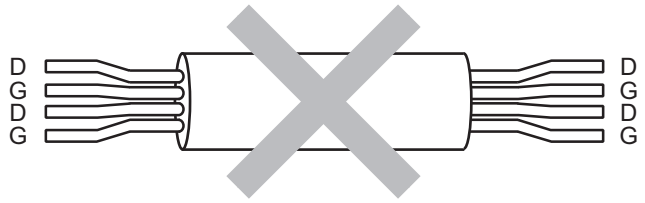
- For processing a 0.75 mm^2 wire : AI 0,75-8 GY
- For processing a 1.25 mm^2 wire : AI 1,5-8 BK
- For processing a 2 mm^2 wire : AI 2,5-8 BU or others
- For processing two 0.75 mm^2 wires : AI-TWIN 2 × 0,75-8 GY
- For processing two 1.25 mm^2 wires : AI-TWIN 2 × 1,5-8 BK

When connecting two wires to one terminal, connect the two wires together to the TWIN bar terminal.

When TWIN bar terminals are used for this transmission line terminal block, the maximum wire diameter is 1.25 mm^2.
For details on sizes other than those listed above and crimping tools, refer to the catalog or website of Phoenix Contact Co., Ltd.

Point

- Do not run multiple transmission lines (D, G) using a multicore cable.

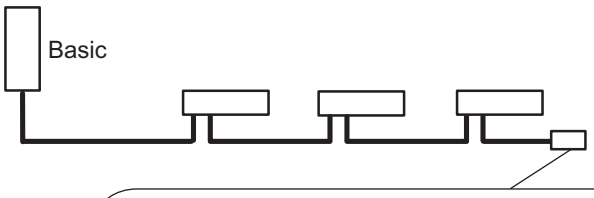


- Use the following line diameters for the transmission lines.
  - 200 m or shorter: 0.75 mm^2 to 1.25 mm^2
  - 200 m or longer: 0.9 mm^2 to 1.25 mm^2
- The voltage should not fall below the lower limit of the allowable voltage range due to the voltage drop caused by the cable.
  If the voltage falls below the lower limit, malfunctions may occur. If the voltage falls substantially, install the external power supply.
  For installing the external power supply, refer to the "AnyWire DB A20 Series Technical Manual" (manufactured by Anywire Corporation).
- Do not connect soldered cables directly to the terminals. Doing so may loosen the screws, resulting in a poor contact.

7.4 Terminating Unit

To ensure more stable transmission quality, connect a terminating unit (AT2 manufactured by Anywire Corporation) to the end of the transmission line.

■ Terminating unit connection



Important

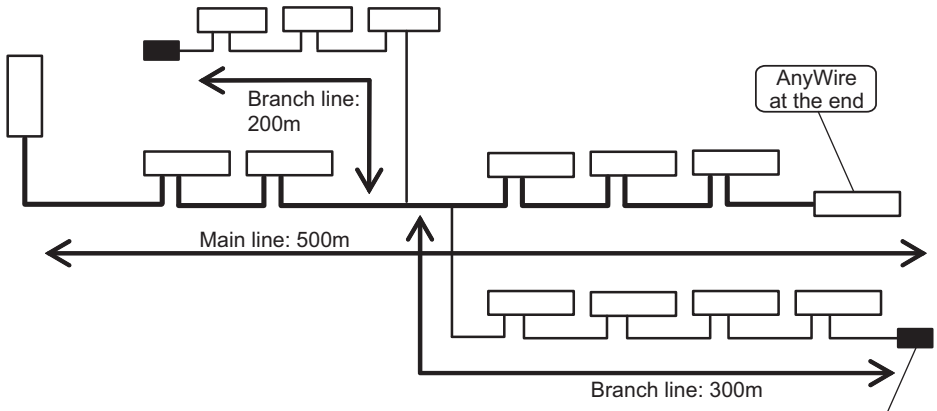
Connect a terminating unit at the end of a line for one master module.

Transmission distance 50m (total length)
200m (total length)
1km (total length)
3km (total length)

The setting applies to all the transmission speeds.

■ Branch of transmission lines (transmission distance: 1km)

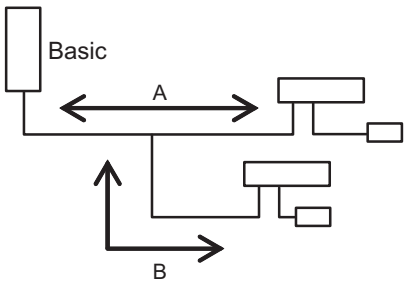
【Example】



Important

Connect one terminating unit at the end of a branch line that exceeds 200m.
Contact us if more than two branch lines exceed 200m.

■ Total length



The total length of the transmission distance for the AnyWire DB A20 can be calculated from A + B. Note that the total length should not exceed the maximum transmission distance set for the system to branch lines.

CHAPTER 8 TRANSMISSION TIME

This section describes the transmission cycle time and transmission delay time of AnyWire DB A20.

8.1 Transmission Cycle Time

The transmission cycle time is the time required for the master module and all the slave modules to update I/O data.

8.1.1 Transmission cycle time of the QJ51AW12D2

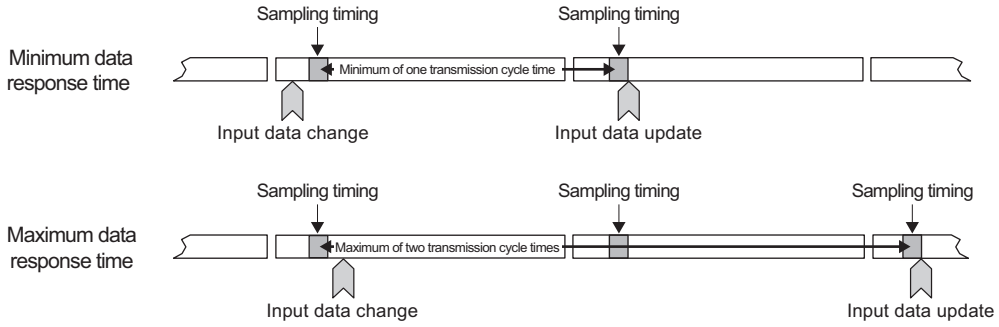
The transmission cycle time of the QJ51AW12D2 is listed in the table below.

Maximum number of transmission points setting	Transmission cycle time (ms)			
	125 kHz	31.3 kHz	7.8 kHz	2 kHz
	(50 m)	(200 m)	(1 km)	(3 km)
64 points (32 points × 2)	0.42	1.7	6.8	24.8
128 points (64 points × 2)	0.7	2.7	10.9	40.7
256 points (128 points × 2)	1.2	4.8	19.1	72.4
384 points (192 points × 2)	1.7	6.8	27.3	104.2
512 points (256 points × 2)	2.2	8.9	35.5	135.9
640 points (320 points × 2)	2.7	10.9	43.6	167.6
768 points (384 points × 2)	3.2	13.0	51.8	199.4
896 points (448 points × 2)	3.8	15.0	60.0	231.1
1024 points (512 points × 2)	4.3	17.1	68.2	262.9
2048 points (1024 points × 2)	8.4	33.4	133.8	516.8

8.1.2 Effects of the double check system

(1) Input

On the QJ51AW12D2 side, if the same data is not repeated twice in continuance, the input area data is not updated (double check). Therefore, a minimum of one transmission cycle time and a maximum of two transmission cycle times are required for the data response time.
Signals of two-transmission cycle time or less may not be captured depending on the timing.
Therefore, to ensure the response, provide an input signal that is longer than two-transmission cycle time.



(2) Output

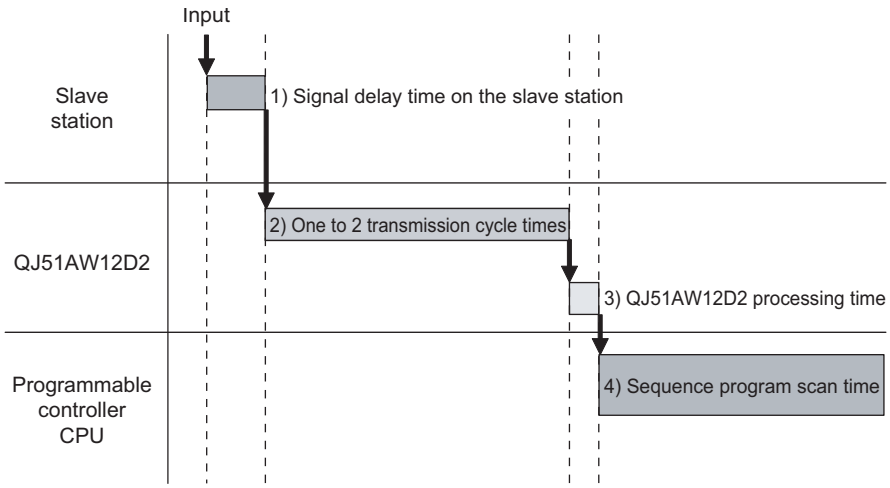
As the double check is performed on the slave module side, the time required is the same as that for input, namely a minimum of one-transmission cycle time and a maximum of two-transmission cycle time.

8.2 Transmission Delay Time

This section describes the transmission delay time (time until data is transmitted).

8.2.1 Slave module (input) to master module

The figure below shows the time between a signal input to the slave module and the CPU module device (X) turning on/off.



[Calculation formula]

1) Signal delay time of the slave module + 2) Transmission cycle time × 2 +

3) Processing time on the QJ51AW12D2 side + 4) Sequence program scan time × 2 [ms]

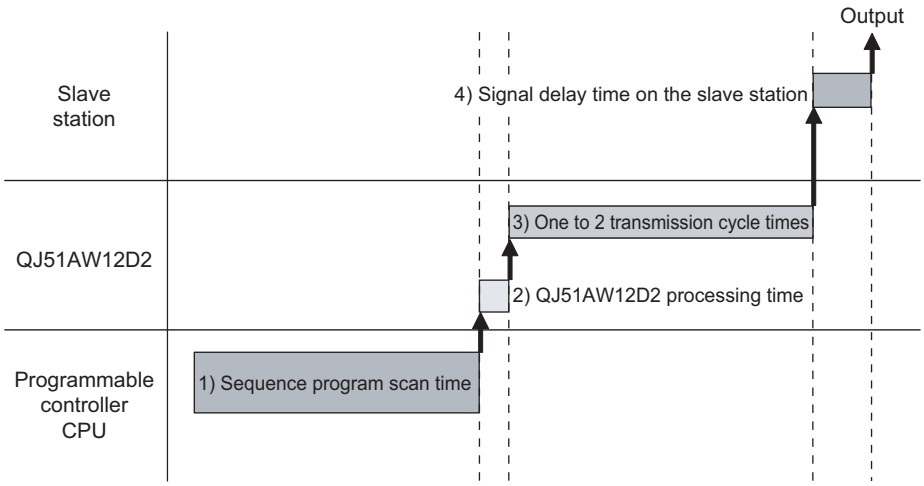
[Calculation example]

1) Signal delay time of the slave module
   Signal delay time of the slave module is 0.17 ms: 0.17 [ms]
2) Transmission cycle time × 2
   When the transmission point is set to 1024 and the transmission speed is set to 31.3 kHz: 17.1 × 2 = 34.2 [ms]
3) Processing time on the QJ51AW12D2 side
   Processing time on the QJ51AW12D2 side = Transmission speed clock width × 16
   When the transmission speed is set to 31.3 kHz: (1 ÷ 31.3 k) × 16 = 0.511 [ms]
4) Sequence program scan time × 2
   Set the sequence program scan time to 5 ms: 5 × 2 = 10 [ms]

Therefore, the transmission delay time is 0.17 + 34.2 + 0.511 + 10 = 44.88 [ms].

8.2.2 Master module to slave module (output)

The figure below shows the time between the CPU module device (Y) turning on/off and a signal output from the slave module turning on/off.



[Calculation formula]

1) Sequence program scan time + 2) Processing time on the QJ51AW12D2 side + 3) Transmission cycle time × 2 + 4) Signal delay time of the slave module [ms]

[Calculation example]

1) Sequence program scan time
   Set the sequence program scan time to 5 ms: 5 [ms]
2) Processing time on the QJ51AW12D2 side
   Processing time on the QJ51AW12D2 side = Transmission speed clock width × 16
   When the transmission speed is set to 31.3 kHz: (1 ÷ 31.3 k) × 16 = 0.511 [ms]
3) Transmission cycle time × 2
   When the transmission point is set to 1024 and the transmission speed is set to 31.3 kHz: 17.1 × 2 = 34.2 [ms]
4) Signal delay time of the slave module
   Signal delay time of the slave module is 0.01 ms: 0.01 [ms]

Therefore, the transmission delay time is 5 + 0.511 + 34.2 + 0.01 = 39.72 [ms].

CHAPTER 9 TROUBLESHOOTING

If the transmission does not start normally, check the following items and perform the troubleshooting.

- All devices are being supplied with 24VDC power supply.
- The "LINK" LEDs of all the AnyWire DB A20 slave modules are flashing.
- The address settings are correct and unique.

Remark

The reference pages for each specification required during troubleshooting are listed below.

- Operation mode : ☞ Page 21, CHAPTER 3
- Data I/O : ☞ Page 25, CHAPTER 4
- Details of the LED display : ☞ Page 34, CHAPTER 6
- Connections : ☞ Page 36, CHAPTER 7

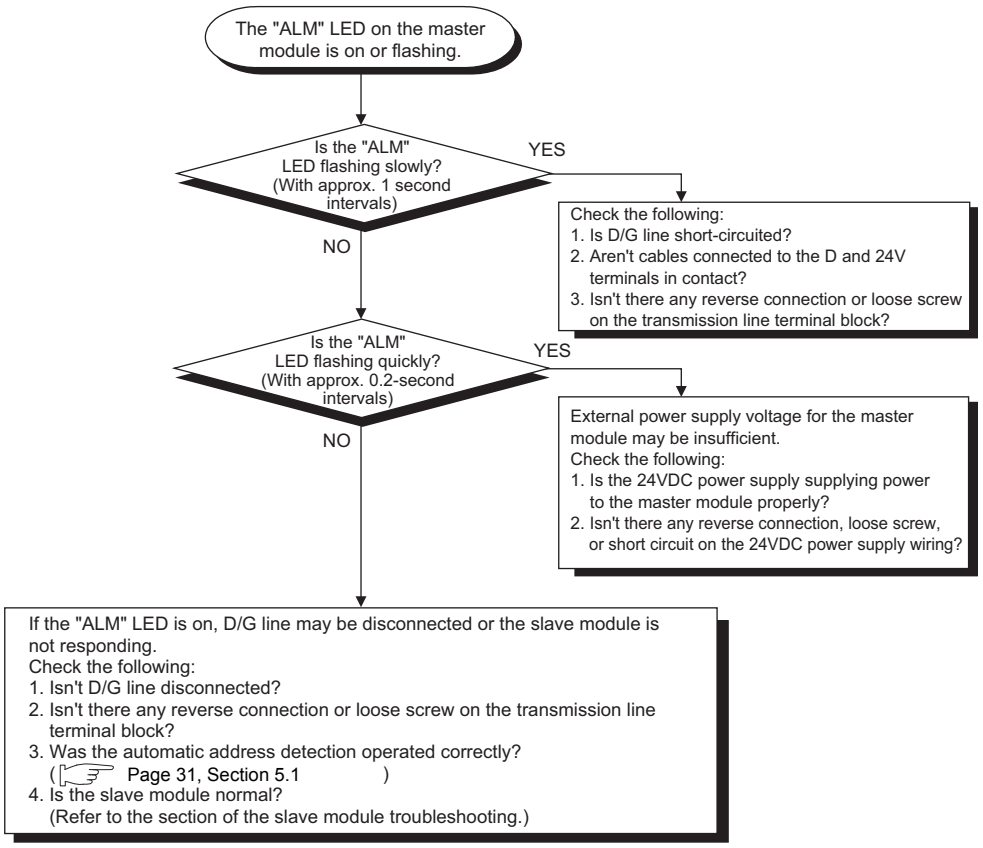
For details on the entire AnyWire DB A20 system, refer to the "AnyWire DB A20 Series Technical Manual" (manufactured by Anywire Corporation).

9.1 Troubleshooting Flow

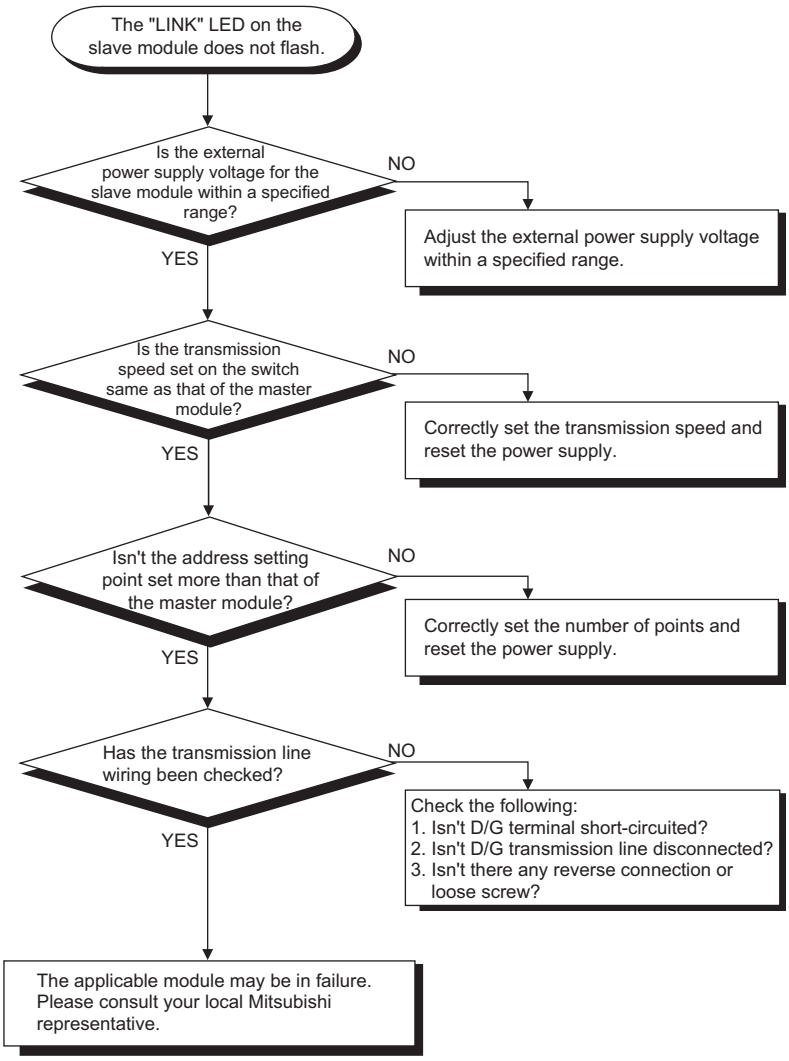
9.1.1 When transmission does not start

Transmission does not start.
Is the "LINK" LED on the master module flashing?
NO
YES
Is the "M ERR." LED on the master module on?
NO
The applicable module may be in failure. Please consult your local Mitsubishi representative.
YES
1
Is the "ALM" LED on the master module off?
NO
Page 46, Section 9.1.2
Refer to the section "When the "ALM" LED is on or flashing".
YES
Is the "M ERR." LED on the master module on?
NO
YES
1
Is the "RDY" LED on the slave module on?
NO
If the "RDY" LED on the slave module is not on, external power supply for the master module may be insufficient.
Check the following:
1. Is the voltage for external power supply within a specified range?
2. Is the power supply stable? (Has a momentary power failure for 0.6ms or more occurred to the 24VDC power supply?)
3. Isn't the power cable disconnected?
4. Isn't there any reverse connection, loose screw, or short-circuited?
YES
NO
Has the master module properly been mounted on the base unit?
Properly mount the master module on the base unit and reset the CPU.
YES
YES
Is the "LINK" LED on the slave module flashing?
NO
Page 47, Section 9.1.3
Refer to the section "When the "LINK" LED on the slave module does not flash".
Execute the troubleshooting using the programming tool.
1. Sequence program
Are conditions for the module access satisfied?
Is a syntax of the FROM/TO instructions correct?
2. Parameter setting
Is the setting location of "Switch Setting for I/O and Intelligent Function Module" same as the slot on which the module is mounted?
Has the programming tool correctly been configured?
NO
Properly configure the programming tool.
YES
The applicable module may be in failure. Please consult your local Mitsubishi representative.

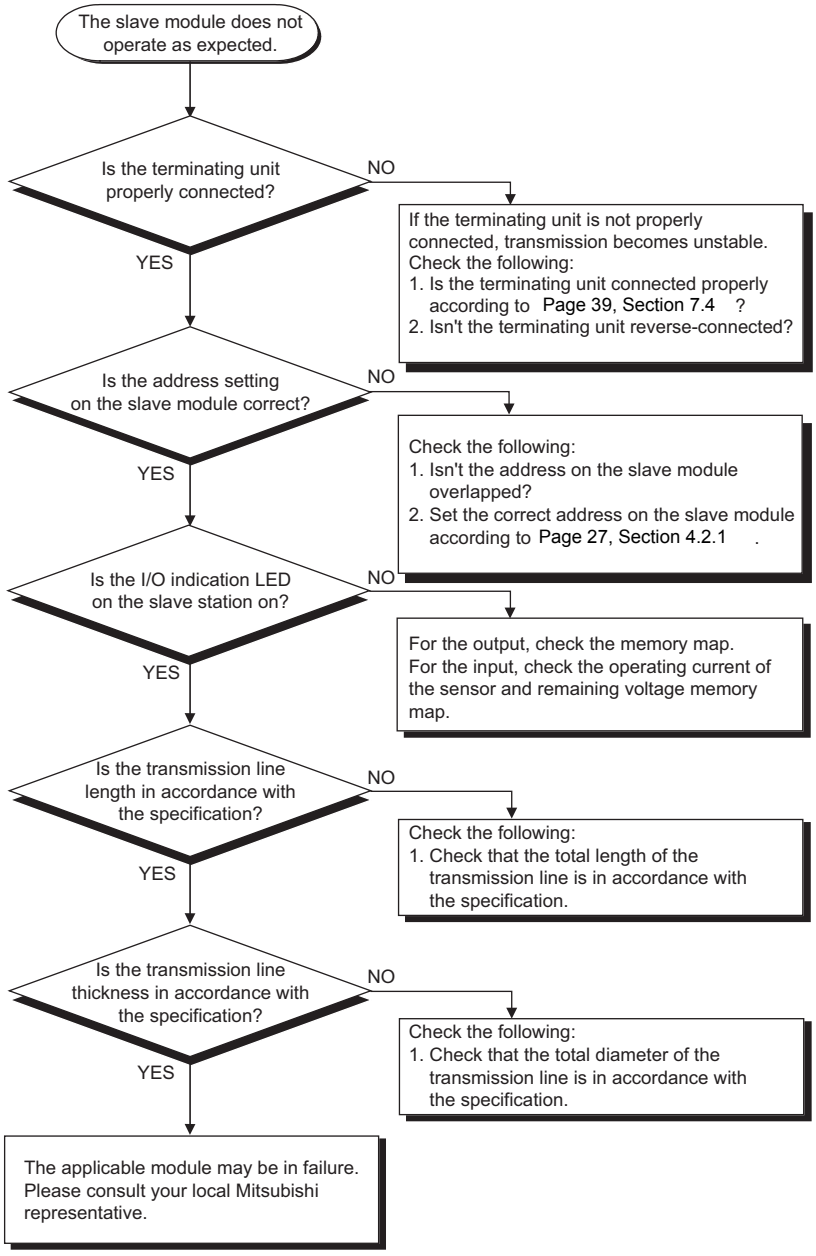
9.1.2 When the "ALM" LED on the master module is on or flashing


The "ALM" LED on the master module is on or flashing.
Is the "ALM" LED flashing slowly? (With approx. 1 second intervals)
YES
NO
Check the following:
1. Is D/G line short-circuited?
2. Aren't cables connected to the D and 24V terminals in contact?
3. Isn't there any reverse connection or loose screw on the transmission line terminal block?
Is the "ALM" LED flashing quickly? (With approx. 0.2-second intervals)
YES
NO
External power supply voltage for the master module may be insufficient.
Check the following:
1. Is the 24VDC power supply supplying power to the master module properly?
2. Isn't there any reverse connection, loose screw, or short circuit on the 24VDC power supply wiring?
If the "ALM" LED is on, D/G line may be disconnected or the slave module is not responding.
Check the following:
1. Isn't D/G line disconnected?
2. Isn't there any reverse connection or loose screw on the transmission line terminal block?
3. Was the automatic address detection operated correctly?
(Page 31, Section 5.1)
4. Is the slave module normal?
(Refer to the section of the slave module troubleshooting.)

9.1.3 When the "LINK" LED on the slave module does not flash


The "LINK" LED on the slave module does not flash.
Is the external power supply voltage for the slave module within a specified range?
NO
Adjust the external power supply voltage within a specified range.
YES
Is the transmission speed set on the switch same as that of the master module?
NO
Correctly set the transmission speed and reset the power supply.
YES
Isn't the address setting point set more than that of the master module?
NO
Correctly set the number of points and reset the power supply.
YES
Has the transmission line wiring been checked?
NO
Check the following:
1. Isn't D/G terminal short-circuited?
2. Isn't D/G transmission line disconnected?
3. Isn't there any reverse connection or loose screw?
YES
The applicable module may be in failure. Please consult your local Mitsubishi representative.

9.1.4 When the slave module does not operate as expected


The slave module does not operate as expected.
Is the terminating unit properly connected?
NO
If the terminating unit is not properly connected, transmission becomes unstable.
Check the following:
1. Is the terminating unit connected properly according to Page 39, Section 7.4 ?
2. Isn't the terminating unit reverse-connected?
YES
Is the address setting on the slave module correct?
NO
Check the following:
1. Isn't the address on the slave module overlapped?
2. Set the correct address on the slave module according to Page 27, Section 4.2.1 .
YES
Is the I/O indication LED on the slave station on?
NO
For the output, check the memory map.
For the input, check the operating current of the sensor and remaining voltage memory map.
YES
Is the transmission line length in accordance with the specification?
NO
Check the following:
1. Check that the total length of the transmission line is in accordance with the specification.
YES
Is the transmission line thickness in accordance with the specification?
NO
Check the following:
1. Check that the total diameter of the transmission line is in accordance with the specification.
YES
The applicable module may be in failure.
Please consult your local Mitsubishi representative.

9.2 Symptom Checklist

Symptom	Check Item	Check
Data I/O is impossible.	■QJ51AW12D2 side	
	Is 24 V DC being supplied appropriately?	☐
	Is the D/G line connected correctly?	☐
	Was the operation mode selector set correctly?	☐
	Does the number of connected I/O points set for switch 1 in "Switch Setting for I/O and Intelligent Function Module" match the number of I/O points specified in the program?	☐
	■Slave module side	
	Is 24 V DC power being supplied appropriately?	☐
	Is the D/G line connected correctly?	☐
	Was the address set correctly?	☐
	Does the transmission speed match that of the master module?	☐
	Does the slave module have the same specifications (such as the transmission clock and number of I/O points) or the same settings as the master module?	☐
	■ CPU module side	
	Is I/O data enabled after 2 seconds or more since the programmable controller is powered on?	☐
	Do the setting location and slot location of the "Switch Setting for I/O and Intelligent Function Module" match?	☐
	Are the transmission setting values correct?	☐
Data I/O is unstable.	Are AT2s (terminating units) connected? Are the poles connected in reverse?	☐
	Does the actual transmission line length exceed the setting length?	☐
	Is a shield line being used for multiple-point grounding?	☐
The "RDY" LED on the slave module is flashing.	Is the supply voltage within the allowable voltage range (21.6 V to 27.6 V)?	☐
	Is the power supply line disconnected? Or is the power supply terminal loose?	☐
The "LINK" LED on the slave module does not flash.	Does the address setting value exceed the number of transmission points?	☐
	Does the transmission speed setting match that of the master module?	☐
	Is D/G terminal loose?	☐
	Is D/G line disconnected?	☐
The "ALM" LED on the QJ51AW12D2 is on.	Is D/G line disconnected?	☐
	At the startup, was the automatic address detection operated correctly?	☐
	Are the terminal block screws loose?	☐
The "ALM" LED on the QJ51AW12D2 is flashing slowly *1.	Is D/G line disconnected?	☐
	Are cables connected to the D and 24V terminals in contact?	☐
The "ALM" LED on the QJ51AW12D2 is flashing quickly *2.	Is 24 V DC power being supplied to the QJ51AW12D2? Isn't the voltage too low?	☐
The "M ERR." LED on the QJ51AW12D2 is on.	Is the QJ51AW12D2 installed correctly on the base unit?	☐
	Were the parameter settings on the CPU module configured correctly?	☐
	Were the parameters written and was the CPU module reset?	☐
The "ERR." LED on the CPU module is flashing.	Is the CPU module installed correctly on the base unit?	☐
	Were the parameter settings on the applicable CPU module configured correctly?	☐

*1 "Slow flashing": at approximately one-second intervals

*2 "Fast flashing": at approximately 0.2-second intervals

APPENDIX

Appendix 1 EMC and Low Voltage Directives

Compliance with the EMC Directive, which is one of the EU directives, has been mandatory for the products sold within EU member states since 1996 as well as compliance with the Low Voltage Directive since 1997.
To prove the compliance with these Directives, manufacturers must issue an EC Declaration of Conformity and the products must bear a CE marking.

(1) Sales representative in EU member states

The sales representative in EU member states will be:
Name : Mitsubishi Electric Europe BV
Address : Gothaer Strasse 8, 40880 Ratingen, Germany

Appendix 1.1 Requirements for compliance with the EMC Directive

The EMC Directive sets two requirements for compliance: emission (conducted and radiated electromagnetic energy emitted by a product) and immunity (the ability of a product to function without being influenced by externally generated electromagnetic energy), and all applicable products are required to satisfy these requirements. This section summarizes the precautions for machinery constructed with this product to comply with the EMC Directive. These precautions are based on the requirements of the EMC Directive and the harmonized standards. However, they do not guarantee that the entire machinery constructed according to the descriptions complies with the EMC Directive. The manufacturer of the machinery must determine the testing method for compliance and declare conformity to the EMC Directive.

(1) Installation in control panel

Programmable controller is an open type device and must be installed inside a control panel.*1
This ensures safety as well as effective shielding of electromagnetic noise emitted from this product.

*1 Modules on the remote station in each network must be also installed inside the control panel.
However, waterproof modules on the remote station can be installed outside the control panel.

(a) Control panel

- Use a conductive control panel.
- Mask off the area used for grounding when securing the top or bottom plate to the control panel using bolts.
- To ensure electrical contact between the inner plate and the control panel, mask off the bolt installation areas of an inner plate so that conductivity can be ensured in the largest possible area.
- Ground the control panel with a thick ground cable so that low impedance can be ensured even at high frequencies.
- Keep the diameter of the holes in the control panel 10cm or less.
  If the diameter is larger than 10cm, electromagnetic wave may be emitted. In addition, because electromagnetic wave leaks through a clearance between the control panel and its door, reduce the clearance as much as possible.
  The leakage of radio waves can be suppressed by the direct application of an EMI gasket on the paint surface.

  The tests by Mitsubishi were conducted using a panel having the damping characteristics of 37dB (maximum) and 30db (average) (measured at 3m distance, 30 to 300MHz).

(b) Wiring power and ground cables

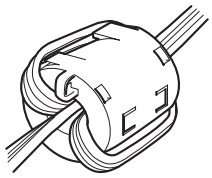
Run the ground cable and the power cable of this product as instructed below.

- Provide a ground point to the control panel near the power supply module. Ground the LG (line ground) and FG (frame ground) terminals of the power supply module for the programmable controller and the LG terminal of the transmission line terminal block to the ground point with the thickest and shortest ground cable possible (about 30cm or shorter). Because the LG and FG terminals serve to dissipate noise generated within the programmable controller to the ground, the impedance of the ground cable must be as low as possible.
  In addition, the ground cable must be kept as short as possible. The ground cable serves to dissipate noise. Because the ground cable itself bear noise, keeping the cable short means that the cable prevents itself from being an antenna.
- The ground cable run from the contact point must be twisted with the power cable. By twisting the power cable with the ground cable, more noise flowing through the power cable can be dissipated to the ground. However, when a noise filter is attached to the power cable, twisting with the ground cable may be unnecessary.

(2) Cables

(a) Cable connected to the transmission line terminal block

For the cable connected to the transmission line terminal block, attach a ferrite core having the attenuation characteristics equivalent to that of ZCAT3035-1330 made by TDK Corporation as close to the transmission line terminal block of this product as possible. Use a ferrite core with three turns of wire as shown below.



(b) Power cable for the 24VDC power supply terminal

Use a CE-marked DC power supply. The DC power supply must be placed together with the module in the same control panel, and the power cable connected to the power terminal of this product should be 30cm or shorter.

(3) External power supply

Use a CE-marked external power supply and ground the FG terminal.
(External power supply used for the tests conducted by Mitsubishi: PS5R-SF24 made by IDEC Corporation)

(4) Power supply module for the programmable controller

Ground the LG and FG terminals after short-circuiting them.

(5) Installation environment

Use this product in Zone A[*1].

*1 Zone means a category determined according to the industrial environment conditions and defined by the harmonized standard EN61131-2 of the EMC and Low Voltage Directives.
Zone C: Main power supply insulated from the public power supply by a special transformer
Zone B: Special power supply with the secondary surge protector from the main power (Rated voltage is assumed to be 300V or less.)
Zone A: Local power supply protected by an AC-DC converter or an insulating transformer from the special power supply (Rated voltage is assumed to be 120V or less.)

Appendix 1.2 Requirements for compliance with the Low Voltage Directive

The Low Voltage Directive does not apply to this product because it operates on 5VDC and 24VDC power supply. For making the PLC system used comply with the Low Voltage Directive, refer to the manual supplied with the CPU module or the base unit.

Memo

REVISIONS

*The manual number is given on the bottom left of the back cover.

Print date	*Manual number	Revision
February 2011	SH(NA)-080968ENG-A	First edition
May 2011	SH(NA)-080968ENG-B	Revision due to error correction
March 2013	SH(NA)-080968ENG-C	Revision due to compliance with EMC and UL/cUL

Japanese manual version SH-080967-C

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WARRANTY

Please confirm the following product warranty details before using this product.

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.
However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.
[Gratis Warranty Term]
The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place.
Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.
[Gratis Warranty Range]

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.
(2) Even within the gratis warranty term, repairs shall be charged for in the following cases.
   1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
   2. Failure caused by unapproved modifications, etc., to the product by the user.
   3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
   4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
   5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
   6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
   7. Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

2. Onerous repair term after discontinuation of production

(1) Mitsubishi shall accept onerous product repairs for one year after production of the product is discontinued. Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.
(2) Product supply (including repair parts) is not available after production is discontinued.

3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each FA Center may differ.

4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation of damages caused by any cause found not to be the responsibility of Mitsubishi, loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products, special damages and secondary damages whether foreseeable or not , compensation for accidents, and compensation for damages to products other than Mitsubishi products, replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

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MELSEC-Q AnyWire DB A20
Master Module User's Manual

Anywire Anywire Corporation http://www.anywire.jp

MODEL	QJ51AW12D2-U-E
MODEL CODE	13JZ52
SH(NA)-080968ENG-C(1303)MEE	

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NAGOYA WORKS : 1-14 , YADA-MINAMI 5-CHOME , HIGASHI-KU, NAGOYA , JAPAN

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